

CLAIMS

WE CLAIM:

1. A valve actuator assembly for selectively opening and closing a valve, the valve actuator assembly comprising:

an output shaft;

a primary motor operatively coupled to the output shaft, the primary motor adapted to receive valve position commands and operable, in response thereto, to selectively drive the output shaft in a valve open or a valve close direction;

a secondary motor operatively coupled to the output shaft, the secondary motor adapted to receive valve position commands and operable, in response thereto, to selectively drive the output shaft in the valve open or valve close direction; and

a tertiary motor operatively coupled to the output shaft, the tertiary motor adapted to receive a flow of fluid and operable, in response thereto, to drive the output shaft in the valve close direction.

2. The valve actuator assembly of claim 1, further comprising:

a first gear set operatively coupled between the primary motor and the output shaft.

3. The valve actuator assembly of claim 2, further comprising:

a second gear set operatively coupled between the first gear set and the output shaft.

4. The valve actuator assembly of claim 3, further comprising:

a third gear set operatively coupled between the secondary motor and the second gear set.

5. The valve actuator assembly of claim 1, further comprising:
a control circuit coupled to the primary and secondary motors and configured to supply the valve position commands thereto.
6. The valve actuator assembly of claim 1, further comprising:
a decoupler coupled between the primary and secondary motors and the output shaft; the decoupler adapted to receive a flow of fluid and operable, in response thereto, to decouple the output shaft from the primary and secondary motors.
7. The valve actuator assembly of claim 1, further comprising.
at least one position sensor mounted on the output shaft.
8. The valve actuator assembly of claim 5, further comprising:
a brake assembly coupled to the primary motor and configured to selectively (i) engage the primary motor, whereby the primary motor is prevented from supplying a drive force to the output shaft and (ii) disengage the primary motor, whereby the primary motor is allowed to supply the drive force to the output shaft.
9. The valve actuator assembly of claim 8, wherein:
the control circuit is further operable, in response to the valve position commands, to selectively supply brake control signals; and
the brake assembly is coupled to receive the brake control signals and is operable, in response thereto, to selectively engage and disengage the primary motor.

10. The valve actuator assembly of claim 9, wherein the brake assembly is configured to engage the primary motor at least when the brake assembly is de-energized.

11. The valve actuator assembly of claim 5, further comprising:
a rotational position sensor coupled to the primary motor and configured to supply one or more signals representative of a rotational position of the primary motor.

12. The valve actuator assembly of claim 11, wherein the control circuit is (i) coupled to receive the rotational position signals from the rotational position sensor and (ii) configured to supply the valve position commands based at least in part on the rotational position signals.

13. The valve actuator assembly of claim 1, wherein the primary motor is a brushless DC motor.

14. The valve actuator assembly of claim 1, wherein the primary motor is an AC induction motor.

15. The valve actuator assembly of claim 1, wherein the primary and secondary motors each further include a temperature sensor coupled thereto.

16. The valve actuator assembly of claim 15, wherein the primary and secondary motor temperature sensors are RDT sensors.

17. The valve actuator assembly of claim 15, wherein the primary and secondary motor temperature sensors are resolver sensors.

18. The valve actuator assembly of claim 15, wherein the primary and secondary motor temperature sensors are thermocouples.

19. The valve actuator assembly of claim 1, wherein the tertiary motor is a pneumatic motor and the fluid is pressurized air.

20. The valve actuator assembly of claim 19, wherein the primary and secondary motors are electric motors.

21. A valve actuator assembly for selectively opening and closing a valve, the valve actuator assembly comprising:

an output shaft;

a first electric motor operatively coupled to the output shaft, the first electric motor adapted to receive valve position commands and operable, in response thereto, to selectively drive the output shaft in a valve open or a valve close direction;

a second electric motor operatively coupled to the output shaft, the second electric motor adapted to receive valve position commands and operable, in response thereto, to selectively drive the output shaft in the valve open or valve close direction; and

a pneumatic motor operatively coupled to the output shaft, the pneumatic motor adapted to receive a flow of fluid and operable, in response thereto, to drive the output shaft in the valve close direction.